

## The Lean Enterprise: An Executive Summary by P<sup>2</sup>

Packaging executives face daily challenges associated with the industry's over capacity and global competition. How can we remain profitable when the market sets the price and demands both increased service and speed of delivery? How can we respond to the growing threat of cheap overseas packaging manufacture? Many of the principles and practices that lower the cost of production may be found the Lean Enterprise.

*The term Lean Manufacturing" was coined by James Womack & Daniel Jones Authors of Lean Thinking*

### What is Lean?

Lean Manufacturing has been defined as manufacturing without waste of material, time, or human capital. Someone has said that waste is anything your customer would not gladly pay for, were you to list it separately on the invoice. Today many customers demand a quality product with increasing service, and the promise of a lower price next year. To be profitable the manufacturer must make more with less, less effort, variability, material, and labor. In the Lean enterprise the focus is not on foreign competition but on packaging enemy #1, waste.



#### Characteristics of a Lean Packaging Enterprise

- **Fast & Flexible**
- **Higher profit through lower cost**
- **Mutually beneficial partnerships with customers and suppliers**
- **Stable workforce committed to continuous improvement**
- **Plant tours that "sell"**

The Lean Enterprise has declared war on waste in all areas of the company, not just the manufacturing floor. Too often Lean practices are mistaken for manufacturing floor initiatives. In truth the minutes and hours saved through machine process improvements will be dwarfed by the days that can be saved through improvement of administrative policy and practice.

### Don't Dabble

During the recent Tour de France it seemed that there were enthusiastic new cyclists everywhere. Lance Armstrong's success inspired many weekend warriors to invest time, effort, and equipment in a new level of fitness. For most the commitment was only spandex deep and the yellow jersey will remain a fantasy. Similarly, some have invested in a few Lean tools and have been disappointed in the returns. Lance exemplifies the fact that the results required for competitive advantage are available only to the fully committed. Lean is not for dabblers; it is a different way of doing business.

### The Lean Advantage

The practices of the Lean Enterprise have been developed by Toyota over the past 45 years. They are emulated across industries because they continually lower cost while increasing process reliability and product quality. In 2003 they increased market share and reported earnings of 10.2 Billion dollars while the big three faltered.

The fundamental differences in the Lean enterprise are found in the ideals that drive production. They challenge us to see the delivery of goods and services as a timeline, from order to payment. Any activity that shortens the line makes us more money. Any activity that consumes time, labor, or material without shortening the line is considered waste. Logical? Then reconsider owning or converting material before it is needed by the customer.

Overproduction is the largest form of waste in the industry. Roll rooms and warehouses are full. Production floors are clogged with WIP. The buffer of inventory at each level is necessary when the system is unreliable. When materials and information flow at the speed of customer demand the buffer and its costs may be radically decreased. To accomplish this, the system must be

more predictable from supply chain to order process to machine reliability and speed, to delivery.

**Ideals of Lean**

**Value:** *Provide what the customer wants*  
**Value Stream:** *Order to Cash without waste of resources*  
**Flow:** *Moves thru the system without constraint*  
**Pull:** *Produced at the speed of customer demand*  
**Perfection:** *Continual Improvement*

**Getting Started**

The transformation from Mass to Lean production takes years. So, where to begin? How will you choose the right tool for your specific needs? While P<sup>2</sup> did not develop the tools, we have created a Lean Compass that will allow you to follow data that is readily available in your plant to diagnose the process constraints and to provide a prescription for improvement. It will effectively accelerate the implementation of Lean. The compass points you to the solutions that will make your processes more profitable.

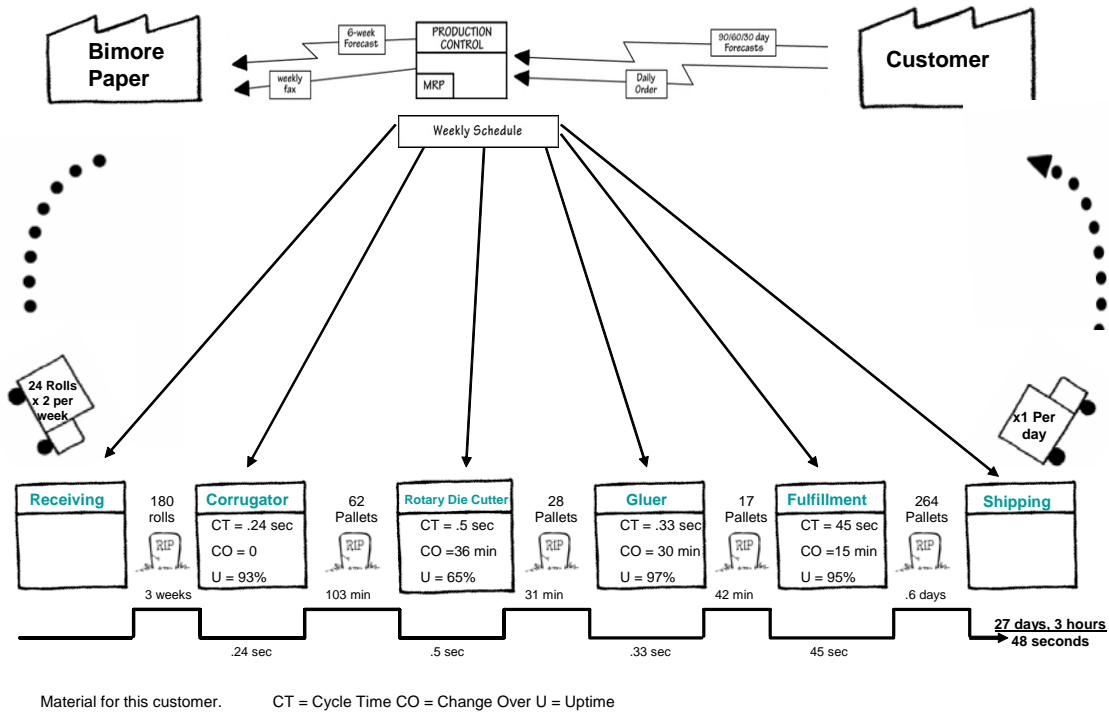
**The Lean Compass**

We will start in the center of the Compass and move out with the concentric circles. The data will tell us where to focus resources so that we use only the tools that will increase profitability. A typical Rotary Die Cutter will be used as an example. While this is a shop floor example the data could just as easily lead to **mistake proofing** of an order entry form in administration.



## Value Stream Mapping

A value stream map tracks the progress of material and information through a process. This low tech tool allows all stakeholders in a process to contribute to the understanding and improvement of the bottlenecks that constrain production. Every step is measured and identified as either adding value or waste. Once the opportunity for improvement has been identified the team assigns a cross functional improvement group to participate in a focused improvement event known as a **Kaizen** Event.



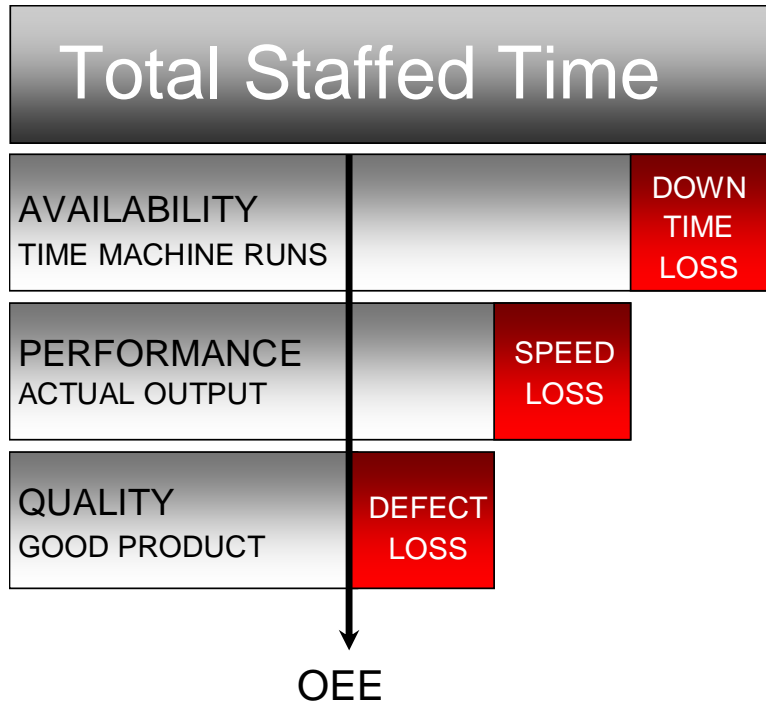
Information flow is depicted on the upper half while material flow is shown across the bottom. Levels of inventory are counted at each step of the process. The time it takes at each step to convert an item is noted along with the reliability of the process. With this information the Kaizen team is able to improve the flow by use of **kanbans**, **FIFO** lanes, and other inventory control tools. The team will reduce inventory to a calculated level that will lower cost and improve flow without disappointing a customer.

In our example there is great opportunity for improvement through reduction of the number of rolls warehoused in the roll room, and in the piles of product found in front of the Rotary Die Cutter.

**Overall Equipment Effectiveness; The second ring**

Traditional measurements in the packaging industry have focused on utilization and speed. This may be due to the fact that most box plants were owned by the same folks who owned the trees and the paper mills. Consequently, a high performing box plant was measured on consumption of paper rather than overall profitability.

Whether the process being measured is an entire plant or an individual machine the same rule applies: You Get What You Measure.



If you measure and reward speed you will get speed at the expense of quality. When a job is particularly important and operators are instructed to closely watch the quality then speed will go down. If utilization is key then we may decrease preventative maintenance and incur the inevitable breakdowns. Even more than most industries, we need a balanced measurement.

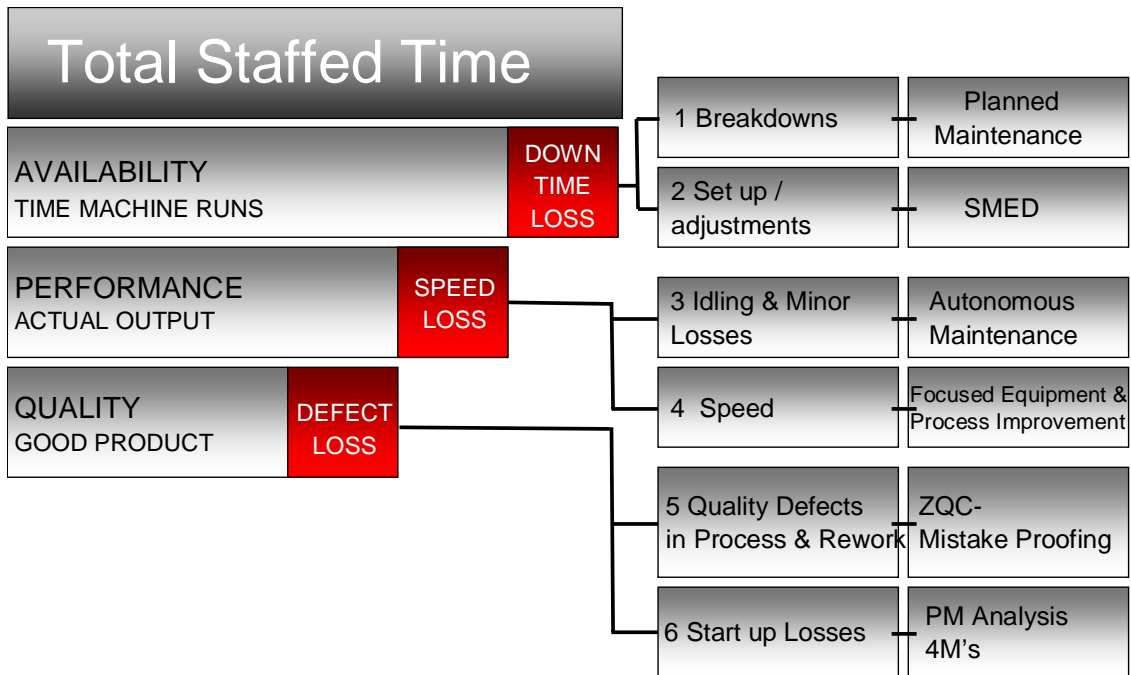
OEE is a balanced measurement that accounts for all three attributes of process health: **Availability, Performance, and Quality.**

The best attribute of OEE is that it is prescriptive; telling you which investment of time and effort will achieve the desired result of increased productivity.

The OEE of the bottleneck Rotary Die Cutter was 14%. Breakdowns, Set-up & adjustment, breaks, and meetings decrease the scheduled operating time. The remaining time of machine availability to run was 35%. During the operating time the machine ran at a reduced speed and experienced minor stoppages which resulted in a Performance of 46%. Finally, start up losses and defects claimed a portion of the sheets rendering the quality rating to 88%. The data points to a need for availability improvement.

## The Six Big Losses The third ring

The Six Big Losses steal productivity, opportunity, time, and money. Manufacturers have been sorting the bugaboos of manufacturing into these categories for fifty years. The compass shows you how to target the particular losses prescribed by data you already track in your plant. This is how you can find direction to indicate a particular tool from the outer ring.



Following the prescription of the OEE data the Availability of the Rotary Die Cutter was investigated. The production numbers showed that the greatest opportunity for improvement lay in set up and adjustment time.

The process improvers were anxious to move to the tools on the outer ring of the compass that would reduce set up and changeover times. However, to ensure that they would achieve sustainable results they first took the time to organize the machine center for success.



### Visual Workplace The fourth ring

Before going to the outer ring and beginning implementation of a particular tool (Quick Change Over in our example) the principles of **7S** are employed. It seems like it will slow improvement down, but the opposite is true. By going directly to a tool you will get bogged down in the clutter and return to 7S. Creating a **Visual Workplace** is the first step every company must take on the Lean journey. In this environment coworkers agree to uphold their own improved standards for workplace organization.



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We must first make the transition from the Industrial Workplace to the Visual Workplace, where it is easy to do thing right and difficult to do them wrong. The 7Ss are made up of three ongoing activities, two agreements which all team members must share, and two key results.

## **Lean Tools; The Outer Ring**

The outer ring depicts examples of specific tools for process improvement. It is a representative list of tools that is by no means exhaustive. Any tools that serve the goals of waste reduction are readily used in a Lean Enterprise.

In the Rotary die Cutter example the production codes tracked machine Availability losses to Set up and Adjustment. Once the area is organized using 7S the crew will be trained to perform Quick Changeovers.

*A Revolution in Manufacturing; the SMED System for set up reduction was written by Shigeo Shingo*



## **Lean Culture**

Having established the compass for your lean journey you will need to carefully consider the effects this type of change will have on your organization. Changes may be required the organization's policy, procedure, and even personality. Three characteristics are common to Lean enterprises. First, they are marked by their commitment to teamwork. Second, they are highly structured in that they build best practices into **standardized work**. Finally they require that everyone in the organization is committed to go beyond problem solving to problem prevention. Consistent teams making processes better every day.

*Decoding the DNA of the Toyota Production System  
By Steven Spear and H. Kent Bowen  
HBR Reprint #99509*



A Lean packaging enterprise will prosper and adapt in the face of world wide competition. When Lean principles and practices drive the strategic plan the result will be a sustained improvement that lowers costs and increases profitability.

**P<sup>2</sup>** (P Squared) is a team of Lean implementers that train by example to show how to shorten the timeline from order to cash. Whether the constraints are due to processes, policies, or personalities **P<sup>2</sup>** will help to create sustainable profitability through reduction in the cost of production.

Contact us on the web at [www.pquaredusa.com](http://www.pquaredusa.com) or call 425-922-6436.

## Terms

FIFO First In First Out, as opposed to First in Last Out or First In Random Out

Kaizen To continually improve. Often used to describe the philosophy of continual improvement. Can also be used to describe an event in which a cross functional team is designated for an intensive improvement task.

Kanban Literally a card used to signal a need for product. Can be used to denote any signal device (e.g. a bin, a pallet, a sound, a light, or a trailer)

Lean Production The manufacturing mindset of continual focus on reduction of waste in all its forms.

Mistake Proofing Also known as Poke-Yoke. The state where an operation has been designed to the point that the task cannot be performed incorrectly

Muda Waste of material, time, or human capital. In administration waste has been described in seven categories: Errors, Delays, Duplication, Unnecessary movement, Unclear communication, Incorrect inventory, and Opportunity lost. On the production floor the list is expanded to 11 classifications of waste: Over production, Waiting, Conveyance, Processing, Inventory, Motion, Processing failures, Administration, Abuse of technology, Creativity, Space.

Standardized Work An agreed-upon set of work procedures that establish the best method and sequence for each process

Visual Workplace A work environment that is organized for success with non-verbal signals and limits that make it easy to do things right